

DOCKET NO: 264704US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
OLEG STENZEL, ET AL : ART UNIT: 1793
SERIAL NO: 10/522,672 :
FILED: AUGUST 16, 2005 : EXAMINER: SMITH, J.
FOR: PRECIPITATED SILICA WITH :
HIGH SURFACE AREA

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated November 14, 2008 of Claims 1-4 (and Claim 20). A Notice of Appeal, along with a one-month extension of time, was timely filed on March 16, 2009.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Evonik Degussa GmbH, having an address at Rellinghauser Strasse 1-11, 45128 Essen, Germany.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal. However, an appeal in US 10/523,029 may have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-4 stand rejected and are herein appealed. Claims 5-15, 17 and 19 stand withdrawn from consideration. Claims 16 and 18 have been canceled. Claim 20, the remaining claim in the application, has not been addressed but to the extent it is rejected, it is also appealed.

IV. STATUS OF THE AMENDMENTS

A response, without amendment, under 37 CFR 1.116, was filed on January 13, 2009. The response asked for the status of Claim 20. An Advisory Action dated March 4, 2009 indicated that the response did not put the application in condition for allowance. The Advisory Action also did not address the status of Claim 20.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

A summary of the claimed subject matter, as claimed in independent Claim 1, is mapped out below, with reference to page and line numbers in the specification added in **[bold]** after each element.

A precipitated silica which has the following properties:

BET surface area	200 - 300 m ² /g ,
CTAB surface area	≥ 170 m ² /g ,
DBP number	200 - 300 g/(100 g), and
Sears number V ₂	23-35 ml/ (5 g). [page 3, lines 27-29]

VI. GROUNDS OF REJECTION

Claims 1-4 (and 20?) stand rejected under 35 USC 103(a) as unpatentable over US 6,180,076 (Uhrlandt et al).

VII. ARGUMENT

Claims 1-4 (and 20?) stand rejected under 35 USC 103(a) as unpatentable over Uhrlandt et al. That rejection is untenable and should not be sustained.

As recited in Claim 1, an embodiment of the present invention is a precipitated silica, wherein said silica has the following properties:

BET surface area	200 - 300 m ² /g ,
CTAB surface area	≥ 170 m ² /g ,
DBP number	200 - 300 g/(100 g), and
Sears number V ₂	23-35 ml/ (5 g).

The present invention is a selection invention from the relatively broader disclosures in the prior art, such as Uhrlandt et al (which is from the same patent family as EP 0901986, described in the specification at the paragraph bridging pages 1 and 2), as now demonstrated.

Uhrlandt et al discloses a precipitated silica having a BET surface area of 120 to 300 m²/g, a CTAB surface area of 100 to 300 m²/g, a Sears number of 6 to 25 ml, a DBP number of 150 to 300 g/100 g and a WK coefficient of < 3.4 (column 1, lines 40-50). Thus, in general, these parameters are significantly broader and inclusive of and/or overlap with the corresponding parameters of the present claims. In addition, all of the Examples of Uhrlandt et al are outside the terms of the present claims.

In other words, the present inventors have succeeded in finding and demarcating, from an unimaginable number of theoretically disclosed silicas in Uhrlandt et al, those which are suitable for incorporation in motor bikes, trucks and high-speed automobile tires. The fact that the selected silicas have a considerable technical advantage will be shown below.

As described in the specification at beginning at page 2, line 7, silicas for commercial-vehicle tires have a requirements profile that is clearly different from that of silicas for passenger-car tires. This area of application imposes the following special requirements,

among others, on the silica: enabling the manufacture of commercial-vehicle tires that, compared with passenger-car tires, have much higher mileage, less wear, off-road ability, good tensile strength and improved traction. On the other hand, silicas for normal passenger-car tires must guarantee low rolling resistance. In addition, the requirements for mileage are much less stringent.

Uhrlandt et al, on the other hand, is concerned with improved dispersability in rubber mixtures (column 1, lines 34- 36). Examples 10 and 11 of Uhrlandt et al provide detailed knowledge on which silicas can be used for incorporation in the running surface of a passenger-car tire and which can be used for incorporation in the carcass of a normal passenger-car tire.

Between the publication of Uhrlandt et al and the filing date of the present invention, it was found that silicas that are suitable for incorporation in normal passenger-car tires are not suitable for incorporation in commercial-vehicle tires, as discussed above. One could not conclude as such from Uhrlandt et al.

As discussed above, Uhrlandt et al discloses very broad ranges for BET, CTAB, DBP number and Sears number. From this, it is statistically possible to calculate a very large number of theoretically disclosed parameter combinations. By comparison, if combination possibilities according to Claim 1 are considered, it is evident that the claimed “combination of parameters,” in effect, claims only a very small and narrow part of the disclosure of Uhrlandt et al. It is therefore necessary to assess the combination of parameters, as opposed to each parameter separately.

Applicants wish to emphasize an important understanding that must be given to precipitated silicas that are to be used as fillers in the preparation of rubber materials, particularly fillers that are to be used in the construction of tire treads, that has long been

known to those of skill in the art, and is described in US 5,929,156 (Fultz et al) at column 3, lines 46-54, as follows:

It is well known that a single physical characteristic, such as surface area or particle size, does little to describe a silica product or to predict its behavior in a specific application. The mechanisms which govern how a particular silica product performs in a given end-use can be extraordinarily complex and are often not well understood; thus, linking one or even a few conventionally-measured silica product physical properties to particular end-use performance characteristics is extremely difficult and potentially misleading.

To that end, the Declaration under 37 C.F.R. § 1.132 of André Wehmeier, filed August 25, 2008 (Wehmeier Declaration) compares a new Example 5 of the present invention with Example 4 of Uhrlandt et al (referred to as Example 6 (Comparative) in the Declaration.) The preparation of a precipitated silica of the present invention is described in Example 5, while information of the silica of Example 4 of Uhrlandt et al is provided. The silicas were mixed into tire rubber formulations as mentioned and the table in the Declaration shows the results of rubber-technical tests. Of noteworthy significance are the dynamic modulus tests at 0° C and 60° C. The rubber product of the present invention (Example 5) is increased over the dynamic modulus results of the comparative rubber formulation of Uhrlandt et al. The higher rigidities of the present rubber are especially important for high speed passenger vehicles and motor cycle tires, as they are evidence of improved traction under dry conditions and higher cornering stability. The higher CTAB values of the present precipitated silica lead to reduced attrition, but maintain the rolling resistance of the tire product comparable to that which is prepared from the precipitated silica of Example 4 of Uhrlandt et al. This effect was unexpected, because one of skill in the art would expect that upon an increase in the CTAB values, an increase in rolling resistance would be observed. This unfavorable effect, however, has not been observed using the precipitated silica of the present invention. In spite of the silica with higher CTAB surface area of of the present invention, the $\tan \delta$ (60° C) values are, favorably, almost unchanged in comparison to the

silica of Example 4 of Uhrlandt et al. The improvement in road abrasion can also be achieved when the high surface area silicas of the present invention are used in natural rubber mixtures, such as those used in truck tire tread mixtures. In particular, in combination with a high surface area, high structure carbon black such as N 121, having excellent road abrasion resistance, can be achieved in truck tires. Especially in this area of improvement in the cut and chip and chunking behavior is of substantial interest and can be implemented by use of the high surface area silicas of the present invention.

In the Final Rejection, and repeated in the Advisory Action, the Examiner continues to find that there is a difference between Sears number V_2 having units of ml/(5g) herein, and Sears index, described in units of ml in Uhrlandt et al. Particularly, the Examiner finds that the respective parameters must be “equated” by multiplying the values of Uhrlandt et al by 5 such that the precipitated silica of Uhrlandt et al would have a Sears number V_2 of 30 to 125 ml/(5g).

In reply, while there may have been inconsistency in how units for “Sears” values are described, the present invention and Uhrlandt et al are disclosing the same parameter, i.e., Sears number and Sears index are synonymous. As well-known, the term “Sears” number, value, index, etc. means that by following the steps of the standardized procedure, one can determine the number of silanol groups on the surface of a silica and that the number obtained can be directly compared to other silicas for which “Sears” data have been obtained. Such a comparison can be made herein where the Sears range of 6-25 ml for the silica of Uhrlandt et al do not compare favorably with the Sears range of 23-35 ml range herein, especially when all the examples of Uhrlandt et al and thus, Uhrlandt et al’s best mode, have Sears values all below 23.

In the Final Rejection, and repeated in the Advisory Action, the Examiner dismisses the comparative evidence presented in the Wehmeier Declaration, on the grounds that the

properties of dynamic modulus and rigidity of tires are not recited in the claims, that limitations from the specification are not read into the claims (citation omitted), that presumably the intended use of the precipitated silicas (the Examiner refers to a “system”) carries no patentable weight, since the claims are drawn to a precipitated silica, and that therefore, the evidence is not commensurate in scope with the claims, as bases for adhering to the rejection.

In reply, the properties of dynamic modulus and rigidity of tires prepared from the present precipitated silica are disclosed properties, as described in the specification at page 32, lines 8-11, which properties therefore **can be** relied upon in evaluating the difference between the precipitated silica as claimed and that of Uhrlandt et al. This fact alone permits or legitimizes the comparative showing that has been presented in the Wehmeier Declaration.

Indeed, the above-discussed properties that the presently-claimed silica imparts to a tire has been shown to be an inherent property of the silica and thus, need not be recited in the claims. Indeed, “[f]rom the standpoint of patent law, a compound and all its properties are inseparable.” *In re Papesch*, 315 F2d 381, 391, 137 USPQ 43, 51 (CCPA 1963). Nor is it relevant that there is no mention of a “system”, i.e., tires, in the claims. For example, a new compound shown to unexpectedly treat cancer would be patentable whether or not a claim to the compound mentions cancer.

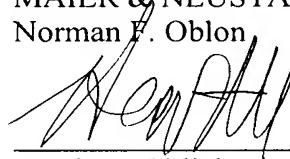
For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that the rejections be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

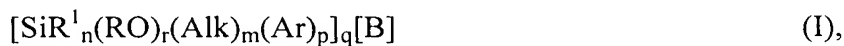
Claim 1. A precipitated silica which has the following properties:

BET surface area	200 - 300 m ² /g ,
CTAB surface area	≥ 170 m ² /g ,
DBP number	200 - 300 g/(100 g), and
Sears number V ₂	23-35 ml/ (5 g).

Claim 2. The precipitated silica as claimed in claim 1, wherein the CTAB surface area is a maximum of 300 m²/g.

Claim 3. The precipitated silica as claimed in Claim 1, which has a WK coefficient of < 3.4 (ratio of the peak height of particles that are not broken-down by ultrasound in the size range 1.0 - 100 μm to the peak height of the broken-down particles in the size range <1.0 μm).

Claim 4. The precipitated silica as claimed in Claim 1, wherein the surface area of the precipitated silica is modified with an organosilane of Formula I to III:



or



with the following meanings

B: -SCN, -SH, -Cl, -NH₂, -OC(O)CHCH₂-, -OC(O)C(CH₃)CH₂- (if q = 1) or -
Sw- (if q = 2), wherein B is chemically bonded to Alk,

R and R¹: an aliphatic, olefinic, aromatic or arylaromatic radicals having 2 to 30 C atoms, which may optionally be substituted by the following groups: hydroxyl, amino, alcoholate, cyanide, thiocyanide, halogen, sulfonic acid, sulfonic acid ester, thiol, benzoic acid, benzoic acid ester, carboxylic acid, carboxylic ester, acrylate, methacrylate, organosilane radical, and where R and R¹ may have an identical or different meaning or substitution,

n: 0, 1 or 2,

Alk: a divalent unbranched or branched hydrocarbon radical having 1 to 6 carbon atoms,

m: 0 or 1,

Ar: an aryl radical having from 6 to 12 carbon atoms, which may be substituted by the following groups: hydroxyl, amino, alcoholate, cyanide, thiocyanide, halogen, sulfonic acid, sulfonic acid ester, thiol, benzoic acid, benzoic acid ester, carboxylic acid, carboxylic acid ester, acrylate, methacrylate, organosilane radical,

p: is 0 or 1, with the proviso that p and n are not simultaneously 0,

q: 1 or 2,

w: a number from 2 to 8,

r: 1, 2 or 3, with the proviso that $r + n + m + p = 4$,

Alkyl: is a monovalent unbranched or branched saturated hydrocarbon radical with 1 to 20 carbon atoms, preferably 2 to 8 carbon atoms, and

Alkenyl: a monovalent unbranched or branched unsaturated hydrocarbon radical having from 2 to 20 carbon atoms.

Claim 20. (New) The precipitated silica as claimed in claim 1, wherein the Sears number V_2 has a value ranging from 26-35 ml/ (5 g).

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EVIDENCE APPENDIX

Declaration under 37 CFR 1.132 of Andre Wehmeier, filed August 25, 2008.

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Rule 132 Declaration

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
STENZEL, OLEG, ET AL : ART UNIT: 1797
SERIAL NO: 10/522,672 :
FILED: AUGUST 16, 2005 : EXAMINER: SMITH, J.
FOR: PRECIPITATED SILICA WITH :
HIGH SURFACE AREA :

DECLARATION UNDER 37 CFR 1.132

COMMISSIONER FOR PATENTS
P. O. BOX 1450
ALEXANDRIA, VIRGINIA, 22313-1450

SIR:

Now comes ANDRE WEHMEIER who deposes and says that:

- (1) I am an inventor of the above-identified invention.
- (2) Since 1998 I have been employed by EVONIK as a researcher engaged in the study of PRECIPITATED SILICAS AND RUBBERREINFORCEMENT.
- (3) I have considered the Office Action of March 28, 2008 and the Uhrlandt et al U. S. Patent 6,180,076 cited therein.
- (4) That in order to demonstrate that the claimed precipitated silica of the present invention, which has the property characteristics set forth in the product claims, results in a tire product of superior high speed characteristics in comparison to a tire product prepared from the

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precipitated silica, as a filler, described in Example 4 of Uhrlandt et al, the following comparative evidence has been obtained and hereby presented.

Example 5 (Invention)

A 29.2 liter amount of water and 0.01 kg of water glass (density: 1.352 kg/l, 27.6 % SiO_2 , 8.20 % Na_2O) are introduced into a reactor made of high quality steel, which has a propeller stirring gear, and is equipped with a double shell for heating purposes. While stirring the aqueous water glass solution vigorously at 66° C for 66 minutes, 7.90 l/hr of water glass and about 1.90 l/hr sulfuric acid (density: 1.40 kg/l, 50.6 % H_2SO_4) are added to the aqueous solution. The sulfuric acid is metered into the solution in such a way that the pH of 10.0 (measured at room temperature) is established in the reaction medium. Then the addition of water glass is stopped and the sulfuric acid is added until a pH of 3.0 (measured at room temperature) is achieved. The suspension that is obtained in this manner is filtered and rinsed with water. The silica slurry has a 17 % solids content and is spray-dried. The pulverulent product that is thus obtained has a BET surface area of 283 m^2/g , a CTAB surface area of 231 m^2/g , DBP absorption of 293 g/(100 g), a Sears number V_2 of 29.7 ml/(5 g) and a conductivity of 320 $\mu\text{S}/\text{cm}$.

Example 6 (Comparative)

The precipitated silica of Example 4 of Uhrlandt et al (EP 0901986) was selected as the filler for the preparation of a rubber compound mixture.

The formulation used for the rubber mixtures of the two examples is that disclosed in Example 4, Tables 5 and 6 of the present specification. The silica of Example 4 of Uhrlandt et al (BET surface area of 185 m^2/g , a CTAB surface area of 163 m^2/g , a DHP index of 269 ml/100 g

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and a Sears index of 17.0) was modified with 6.4 phr Si 69 and 1.51 phr sulfur. In order to take into consideration the higher surface area of the present invention of Example 5 above, the quantity of silane was increased to 8 phr and the quantity of sulfur was reduced to 1.33. A sulfur correction is necessary for a correspondence of the sulfur content of the silane (H. D. Luginsland, J. Frohlich, A. Wehmeier, paper No. 59, April meeting of the ACS in 2001).

The table below shows the results of the rubber-technical tests of Examples 5 and 6.

		Example 4 of EP0901986	Example 5 of the invention
Silica	phr	80	80
Silane	phr	6,4	8,0
<i>ML(1+4) at 100 °C 3rd stage</i>	MU	66	104
Delta torque	dNm	16,8	23,5
t 10 %	min	1,7	0,8
t 90 %	min	6,5	15,3
<i>vulcanization time</i>	min	20	20
<i>Tensile strength (6 rings)</i>	MPa	13,0	11,8
Modulus 100 %	MPa	2,0	2,3
Modulus 300 %	MPa	10,1	9,9
Elongation at break	%	350	335
<i>Shore-A-hardness</i>	SH	66	72
<i>DIN-Abrasion, 10 N</i>	mm ³	86	73
<i>Ball-Rebound, 60 °C</i>	%	63,8	59,7
E*, 0 °C	MPa	19,8	48,1
E*, 60 °C	MPa	8,0	14,9
tan δ, 0 °C	--	0,463	0,408
tan δ, 60 °C	--	0,110	0,115
considered sum of peaks	--	84	54
Peak area (Topo)	%	3,8	1,9

5) The dynamic modulus tests at E^* (0°C and 60°C) in the table above show increased values for the rubber product of Example 5 in comparison to the corresponding values of Example 6. These greater values of the dynamic modulus tests correspond to higher rigidities of the present rubber than the rubber of Example 6 (comparative). The higher rubber rigidity is especially important for high speed passenger vehicles and motor cycle tires, as it is evidence of improved traction under dry conditions and higher cornering stability. The higher CTAB values of the present precipitated silica lead to reduced attrition, but maintains a rolling resistance of the tire product comparable to that which is prepared from the precipitated silica of Example 4 of Uhrlandt et al. This effect was unexpected, because one of skill in the art would expect that upon an increase in the CTAB values, an increase in rolling resistance would be observed. This unfavorable effect, however, has not been observed using the precipitated silica of the present invention. In spite of the silica with higher CTAB surface area of the silica of the present invention, the $\tan \delta$ (60°C) values are, favorably, almost unchanged in comparison to the silica of Example 4 of the EP '986 reference. The improvement in road abrasion can also be achieved when the high surface area silicas of the present invention are used in natural rubber mixtures, such as those used in truck tire tread mixtures. In particular, in combination with a high surface area, high structure carbon black such as N 121, having excellent road abrasion resistance, can be achieved in truck tires. Especially in this area of improvement in the cut and chip and chunking behavior is of substantial interest and can be implemented by use of the high surface area silicas of the present invention.

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(6) The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

(7) Further deponent says not.

31.07.2008

(Date)

A handwritten signature in black ink, consisting of a stylized 'V' followed by a series of loops and a long horizontal stroke, positioned above a horizontal line.

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RELATED PROCEEDINGS APPENDIX

None.